Chapter

Power-Assisted Liposuction Mammaplasty (PALM): A Short Scar Mammaplasty in Gigantomastia

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Abstract

Breast reduction has been widely studied throughout the years, with different types of resection and breast reshaping techniques being described based on one or two pedicles. This chapter introduces the combination of parenchymal resection and liposuction to treat Gigantomastia, leaving a short scar. Liposuction improves breast remodeling, whereas breast glandular resection and repositioning enhances the upper pole fullness. The Power-Assisted Liposuction Mammaplasty (P.A.L.M.) technique is a safe and reliable procedure, insuring an optimal vascularization to the breast through the preservation of the central, superior and lateral pedicle, thus reducing the complication rate. In this chapiter we emphasize the importance of the preoperative markings, considered as essential for optimal results.

Keywords: Breast reduction, mammaplasty, power-assisted liposuction, tri-pedicled, central, superior and lateral based pedicle, short scar, gigantomastia, preoperative markings

1. Introduction

The various techniques of reduction mammaplasty and mastopexy include free nipple [1], wise pattern [2], bipedicle [3–5], inferior pedicle [6, 7], vertical pedicle [8–11], superomedial [12–14], superolateral [15, 16], and septal-based pedicle [17, 18]. There are specific advantages to each technique. However, the majority of those surgeries encounter the identical challenges of recreating upper-pole fullness, conserving the sensation of the nipple areola complex (NAC), and maintaining adequate blood supply with massive breast ptosis. Current reduction mammaplasty techniques identify parenchymal reshaping and resection as critical for maintaining shape. Liposuction of the breast [19–27] by itself or combined with resection of the parenchyma has been utilized safely and reliably since the early 1980s for reduction mammaplasty. One suitable technique for breasts of varying sizes is reduction mammaplasty with liposuction, with aspirate volumes greater than 2000 cc. Liposuction-assisted reduction mammaplasty has had positive results and is associated with very low morbidity rates. Over a 10-year postoperative monitoring period, the safety and reliability of liposuction-assisted vertical reduction mammaplasty has been verified [8, 9, 26, 28].

Liposuction-assisted vertical reduction mammaplasty has a few complications, such as kinking of the pedicle in the markedly glandular breasts, reduction in NAC sensitivity, an ill-defined inframammary fold, and delayed wound healing [28–33]. More recently, the senior author introduced a scarless breast reduction procedure for fatty breasts, associating an extensive breast liposuction to the use of internal threads [34]. We managed to treat fatty breasts mini-invasively by emptying the breast from its volume and molding it accordingly to its desired form and position utilizing loops [34]. The use of internal threads has proven its effectiveness in other breast and body contouring procedures [35–40]. Nevertheless, in breast reduction, this approach is limited to more massive glandular breasts necessitating glandular resection [34].

The power-assisted liposuction mammaplasty (PALM) technique was created to address the complications of liposuction-assisted vertical reduction mammaplasty and the limitations of existing breast reduction techniques [41].

The main procedural steps of PALM include the following:

1. Liposuction of the lower and external poles and areolar zones to minimize not only tension but also kinking of the gland and NAC during transposition.

2. Maximizing the NAC arterial supply and venous return by depending on breast liposuction for volume reduction as well as minimizing glandular resection and preserving the central, lateral, and superior pedicles.

3. Enabling glandular rotation and NAC elevation by creating a subcutaneous upper-pole pocket that can comfortably accommodate the elevated and transposed breast tissue without tension while providing upper-pole fullness.

4. Tunnelization of the area beneath the inframammary fold to promote skin retraction and redraping and to avoid puckering.

5. Liposuction of the lower lateral quadrant of the breast to improve breast contour and shape, or overall breast liposuction to further decrease breast size or improve symmetry. The authors share their experience by presenting their experience with the PALM technique's indications, surgical approach, and outcomes.

6. Suture placement from the dermis to the chest wall for glandular suspension to maintain and ensure longevity of upper-pole fullness and to recreate the inframammary fold.

2. Indications

Our procedure preserves maximal venous and arterial blood supply to the breast and NAC by basing the NAC on the central, lateral, and superior pedicles. Resected parenchymal tissue is minimized and parenchymal transposition is expedited with the use of power-assisted liposuction as the main tool for decreasing breast volume. Sturdy sutures from the dermis to the chest wall enable glandular suspension, keeping upper-pole fullness and recreating the inframammary fold. Because the PALM technique preserves blood supply to the breast and NAC, this technique can be safely performed for patients with gigantomastia, breast hypertrophy, and severely ptotic breasts (NAC elevation up to 28 cm). In our experience, the resection pattern relies on the planned NAC elevation. When the planned NAC elevation is less than 10 cm, vertical wound closure is planned preoperatively. For NAC elevations more

than 10 cm, a short T or J wound-closure pattern is decided intraoperatively after elevation of the NAC to the desired position and redraping the parenchymal tissues.

3. Preoperative planning and markings

With the patient in the standing position, preoperative markings are made. The midline, infra-mammary fold, breast axis and anterior axillary lines are drawn. The nipple-to-sternal notch (N-SN) distance for each breast is determined with a measuring meter and then marked directly on the patient. The sternal notch to IMF distance is marked for both breasts, and the shortest length is reported on the breast to identify the position of the new nipple. This point is located 9–11 cm from the midline (distance x), and represents the medial border of the areola. Note that the distance between the lateral border of the areola and the anterior axillary line should always be x + 2 cm (**Figure 1**).

A mosque pattern is utilized to draw the periareolar markings as described by Le Jour et al. [9]. The mosque's circumference depends on the breast size [41, 42];

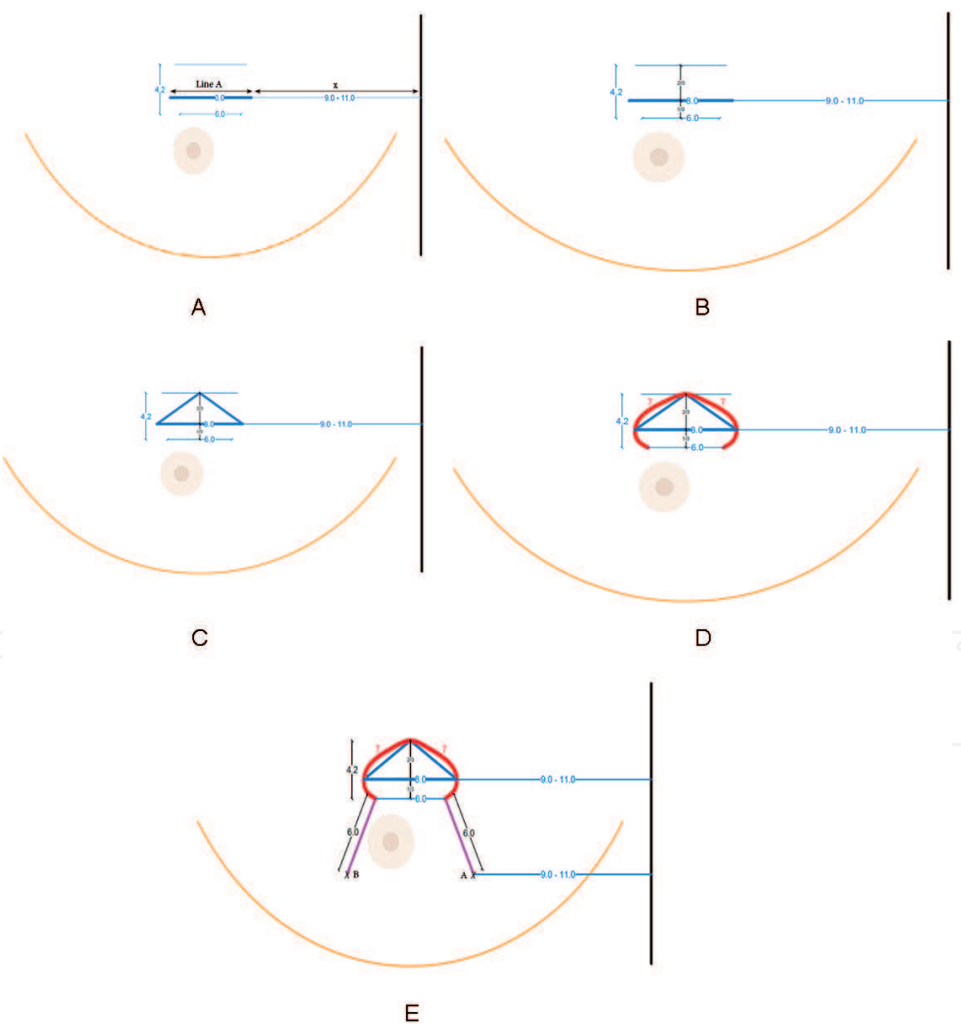

Figure 1.
(A-E) the sternal notch to IMF distance is marked for both breasts, and the shortest length is reported on the breast to identify the position of the new nipple. This point is located 9–11 cm from the midline (distance x), and represents the medial border of the areola. A mosque pattern is utilized to draw the periareolar markings with its circumference ranging from 14 to 16 cm long and 6 to 10 cm wide (line a). The distance between the upper and lower pole of the mosque is represented by the mediator to the line a, and measures 4.2 cm with two third of its length located above the horizontal line.

it ranged from 14 to 16 cm long and 6 to 10 cm wide (line A). The distance between the upper and lower pole of the mosque is represented by the mediator to the line A, and measures 4.2 cm with two third of its length located above the horizontal line. Rotating the breast superolaterally and then superomedially allows the vertical wound closure lines to be drawn along the breast axis, marking 6 cm from the lower edges of the mosque pattern (point A and B). To indicate the planned vertical wound closure, the lines are joined at the mid-distance between the native IMF and the points A and B (**Figure 1**).

3.1 Inverted T or J scar

When a short T or J wound closure is planned, the vertical lines are interrupted at 6 cm (point A and B) and continued as diagonal lines pointing both medially and laterally at 45° in opposite directions. To represent the position of the new inframammary fold, these diagonal lines are joined by a horizontal line located at mid-distance (named a and b) between the IMF and both points A and B (**Figure 2**).

3.2 Vertical scar

When drawing a vertical scar, a horizontal line is marked between both points A and B, followed by a mediator extending inferiorly to this axis until reaching a point located at mid-distance between the native IMF and both points A and B, named point C. Point C will be joined by two diagonal axes originating from both points A and B (**Figure 3**).

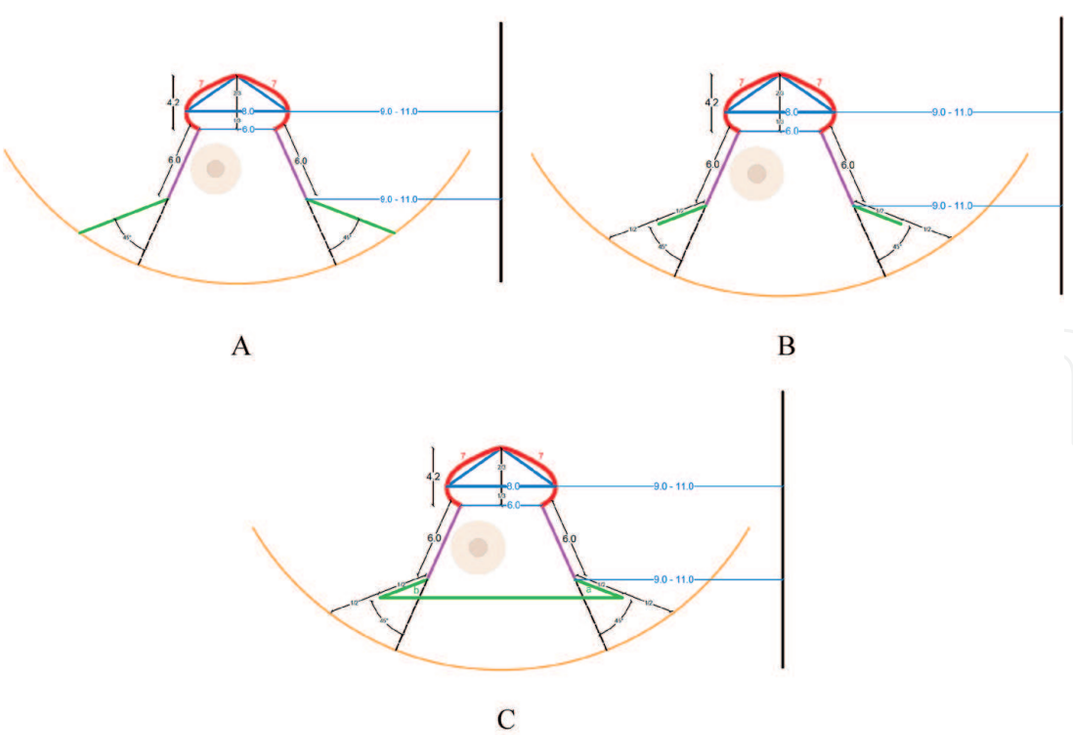

Figure 2.
(A-C) when a short T wound closure is planned, the vertical lines are interrupted at 6 cm (point a and B) and continued as diagonal lines pointing both medially and laterally at 45° in opposite directions. To represent the position of the new inframammary fold, these diagonal lines are joined by a line located at mid-distance (named a and b) between the IMF and both points a and B.

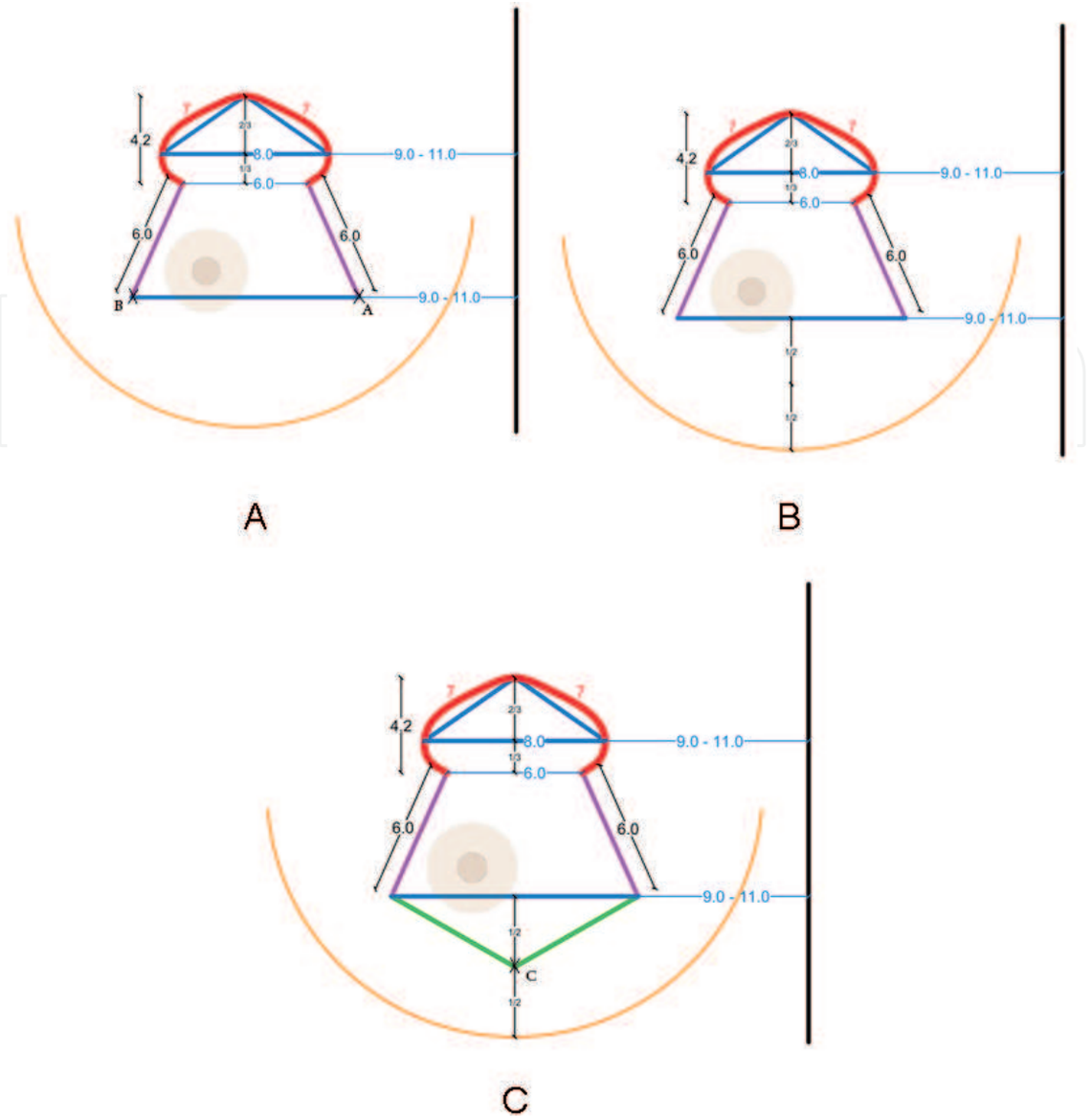

Figure 3.
(A-C) when a vertical scar is planned, a horizontal line is marked between both points A and B, followed by a mediator extending inferiorly to this axis until reaching a point located at mid-distance between the native IMF and both points A and B, named point C. point C will be joined by two diagonal axes originating from both points A and B.

After the preoperative markings are made on one breast, symmetric markings are made on the contralateral breast by pushing the breasts together and duplicating the periareolar and medial/vertical markings. All of the distances are checked per-operatively to adjust the pre-operative drawings, if judged necessary.

Additional preoperative markings include the zones of liposuction, borders of the superior pocket, position of the dermal-chest wall glandular suspension sutures. The planned superior pocket extends inferiorly to the third rib space, laterally from the pectoralis muscle, medially to 3 cm from the midline, and superiorly to the first rib. The dermal-chest wall sutures extend medially from the second, third, fourth, and sixth rib (**Figure 4**).

Video 1 shows the preoperative markings.

Video 1 PALM markings: https://youtu.be/234SxcYo9eE

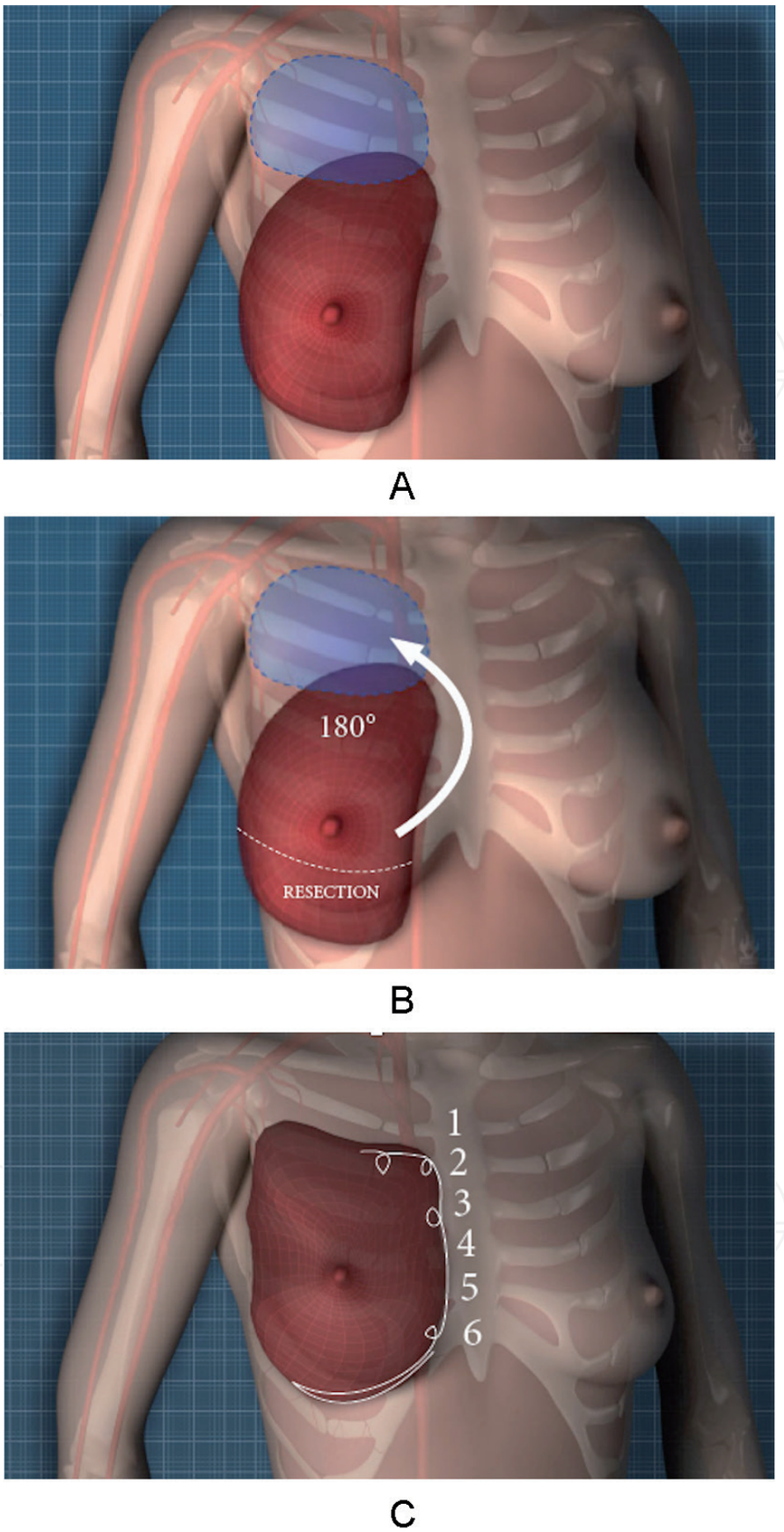

Figure 4.
(A) The blue dotted line and shading indicate the upper pocket. (B) the glandular excess located in the lower pole is resected (white dotted lines). The gland is rotated 180° supero-medially to lift the breast and fill the previously dissected pocket. (C) the glandular suspension is performed through the placement of a barbed suture passed from dermis to chest wall (solid white line). Suturing extends from the second, third, fourth and sixth rib spaces and is continued laterally from the sixth rib space to the breast axis to recreate the IMF. The numbers indicate the rib spaces.

4. Operative technique

4.1 Infiltration

General anesthesia is administered and then the patient is placed in the supine position with the arms abducted at 45°. The markings are verified and corrected if judged necessary. The zone of deepitheliazation, breast gland, and lower pole of each breast are infiltrated with a solution that contains epinephrine 1:100,000 per liter of normal saline associated with 5 mL of Exacyl® (tranexamic acid) 0.5 g/5 mL using a power-assisted liposuction system (Lipomatic, Eva SP, EUROMI SA, Verviers, Belgium) and a 3 mm multihole cannula [43]. The infiltration volume depends on the breast size, mean 280 mL (range 100 mL to 400 mL).

4.2 Breast liposuction

Breast liposuction is performed with the Lipomatic machine in a closed system following the Power-Assisted Liposuction and Lipofilling (PALL) principles, as described in previous articles by the senior author [41, 44–47]. However, liposuction of the breast can also be performed by using a conventional liposuction with the hand piece attached to a suction system. The authors' extensive experience with the Lipomatic device enables more precise zones of liposuction and decreased operative times through less surgeon fatigue. A multiple-hole blunt cannula (3 or 4 mm) is used to perform liposuction to the lower breast quadrants and the retroareolar area in a superficial plane to detach the skin and facilitate undermining. It is performed in a deep plane in the inferior and external poles of the breast in order to reduce the volume.

To enhance matrix dissociation, supplemental subcutaneous tunnelization is performed at the retroareolar space and at the lateral and inferior poles of the breast. Tunnelization extends inferiorly to the inframammary fold in order to accelerate translation of the breast to its new position under minimal tension and to assist with redraping of the skin. The aspirate volume depends on both the shape and size of the breast as well as the extent of breast ptosis, intended amount of breast tissue to be resected, and type of breast parenchyma.

4.3 Deepithelialization

A 42-mm to 45-mm areolar marker is used to delineate the NAC, and a scalpel is used to deepethialize the pedicle along the preoperative markings. At the border of the incision, the scalpel is beveled to deepithelialize more than 5 mm of the epidermis; this is an important maneuver for subsequent wound closure.

4.4 Pedicle dissection and inferior resection of the gland

An incision is performed on the gland along the preoperative drawings. Dissection of the dermis is then performed 5 mm from the edge of the wound with a rim of dermis extending beyond the epidermis along the wound edge. During NAC dissection, a large zone of deepithelialized skin is preserved circumferentially. Both inferior and lower lateral dissection of the gland is then performed to the pectoralis fascia. Lateral dissection, which is enabled by the liposuction and tunnelization performed earlier in the procedure, is started 6 cm from the base of the mosque pattern. The thickness of the inferior pole flap is similar to that of the postmastectomy skin flap because skin undermining is limited. Medial dissection is performed in a beveled manner 2 cm to 3 cm from the edge of the medial.

To maintain fullness of the medial flap, a vertical line is made to the pectoralis fascia. A wide upper-inner supra-aponevrotic pocket is created and dissected on the pectoralis fascia. This pocket extends inferiorly to the third rib space, laterally from the axis of the breast, medially 2 cm to 3 cm from the midline, and superiorly to the first rib. If a subcutaneous tension is judged too important in the upper pole of the breast, a vertical dissection through the gland can be performed to release the tethering fibers.

The upper-inner pocket is extended to minimize tension on the NAC and to ensure upper-pole fullness, because the upper-inner pocket will ultimately contain the upper bulk of the transposed gland. The dissection approach preserves the rich periareolar venous network of the NAC as well as the superior, central, and lateral pedicles (**Figure 4A**).

The excess fatty-glandular tissue in the lower pole of the breast is estimated and resected (**Figure 4B**).

The NAC and breast parenchyma are rotated superomedially by 180° to fill the upper-inner pocket and lift the breast (**Figure 4B**). The NAC is then affixed to its predetermined position. To suspend the breast tissue inside the subcutaneous pocket, barbed running sutures (V-Loc 180, 2–0, Covidien, Mansfield, MA) are placed from the dermis to the chest wall.

Needle bites at the caudal edge of the dermo-glandular flap are utilized to prevent medial tension on the NAC and a medially pointing nipple. The sutures extend medially in a horizontal manner from the middle aspect of the pocket at the level of the second edge to the medial edge of the pocket 2 cm to 3 cm from the midline. Suspension then continues caudally with V-Loc sutures placed in a vertical manner from the second, third, fourth, and sixth rib cartilages (**Figure 4C**).

To suspend the breast tissue inside the subcutaneous pocket, glandular to chest wall sutures are used to avoid tension on the transposed gland and to maintain adequate shaping of the breast mound. After transposition of the gland, the excess tissue localized in the lower part of the breast is originating from the inferior and lateral zone of the breast in the inverted T technique. An horizontal and lateral suture is performed using V-Loc sutures, facing the sixth rib space to the breast axis line and then continued in a superficial plane (**Figure 4C**).

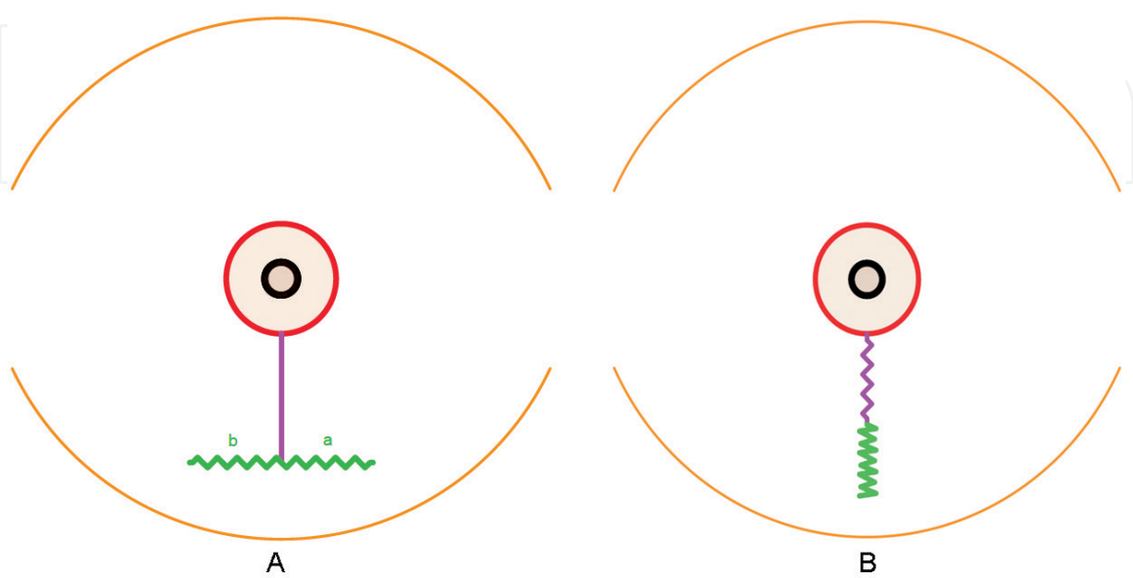

Figure 5.
(A-B) with the same barbed thread, suturing is continued superficially to close the wound. (A) Closure with a short T scar: The reported a and b lengths are equal to the previously measured a and b mid-distances located between the IMF and both points a and B in **Figure 2C**. *(B) Closure with a vertical scar.*

Redraping of the periareolar and vertical wounds is performed using skin staples, which are removed when the final skin closure takes place. In cases where vertical wound closure are not adequate, a peroperative decision regarding pattern of skin closure (either short T or J closure) is made (**Figure 5A**). Closure of the vertical and periareolar wounds is achieved under minimal tension using a 2–0 V-Loc running sutures (**Figure 5**). At the lower part of the wound closure, a subcutaneous drain is placed and secured to the skin. The same procedure is then performed contralaterally.

When necessary, subsequent liposuction is performed. The indications for additional liposuction include treatment of breast asymmetry or fullness at the lower lateral quadrant requiring correction, excess fat necessitating additional volume reduction, and the need for subcutaneous undermining of the lateral breast to relieve persistent tension after the transposition of the breast to its new position.

5. Wound closure

Wound closure is performed in two planes by a single surgeon. The deep plane consists of suturing the dermis to the costal perichondrium in a continuous fashion. The superficial plane is sutured utilizing a running barbed suture through the de-epithelialized dermis, allowing the apposition of the epidermis with minimal tension [48] (**Figure 5**).

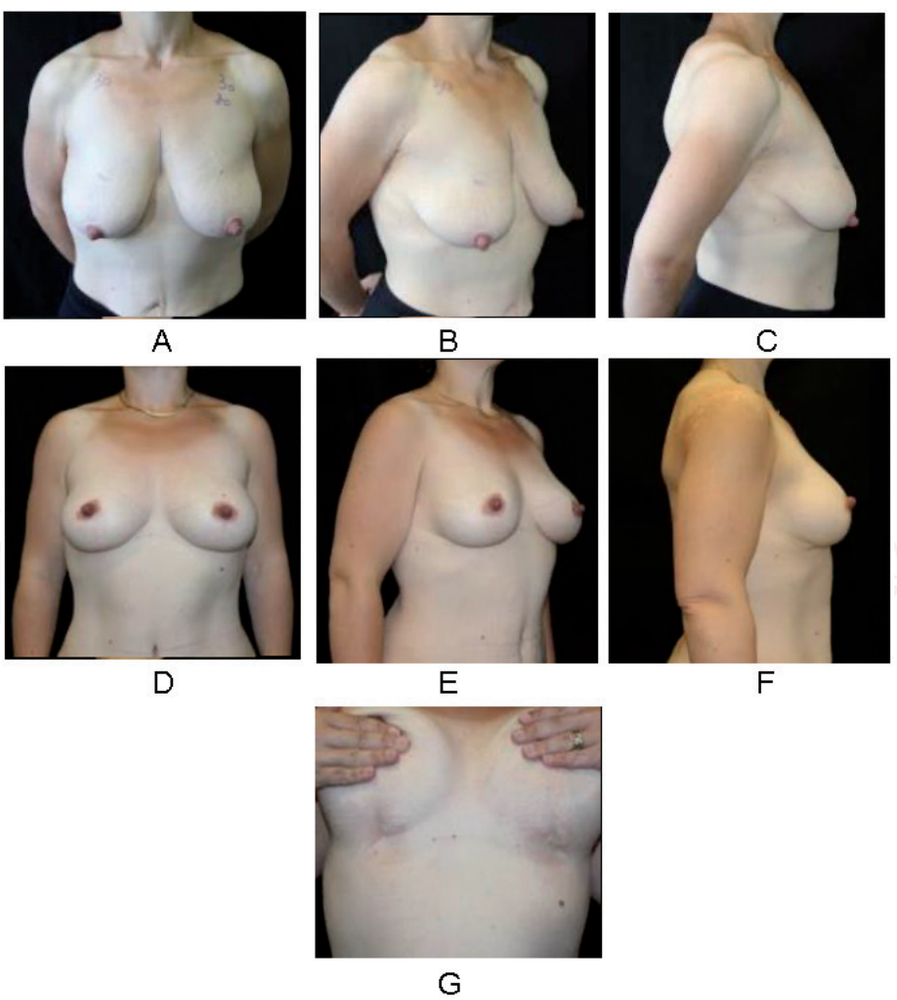

Figure 6.
(A, B, C) preoperative photo of a 45-year-old female patient presenting with bilateral breast hypertrophy and moderate ptosis. The patient underwent a P.a.L.M. procedure using a vertical scar with NAC elevation of 10 cm on the right breast and 10 cm on the left, liposuction of 650 mL on the right breast and 650 mL on the left breast, glandular resection 150 g on both breasts. (D, E, F, G) results at 24 months postoperatively.

Video 2 shows the surgical procedure.
Video 2 PALM surgery: https://youtu.be/BC2R5iYR7Fo
Clinical cases are shown in **Figures 6–11**.

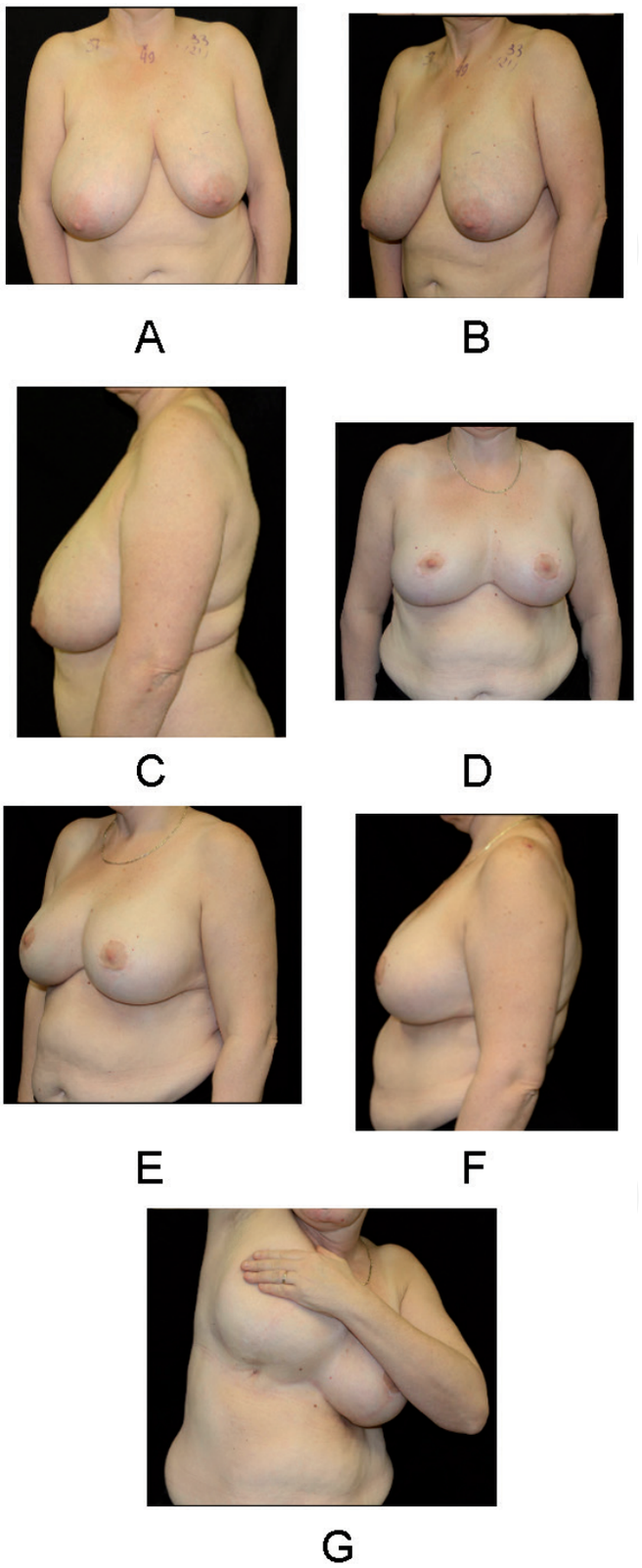

Figure 7.
(A, B, C) preoperative photos of a 49-year-old female patient presenting with bilateral breast gigantomastia, breast asymmetry and ptosis with distance from nipple-to-sternal notch of 52 cm on the right breast and 33 cm on the left. The patient underwent a P.a.L.M. procedure using a vertical scar with NAC elevation of 16 cm on the right breast and 12 cm on the left, liposuction of 800 mL on the right breast and 400 mL on the left breast, glandular resection of 260 g of the right breast and 150 g from the left. (D, E, F, G) results at 36 months postoperatively.

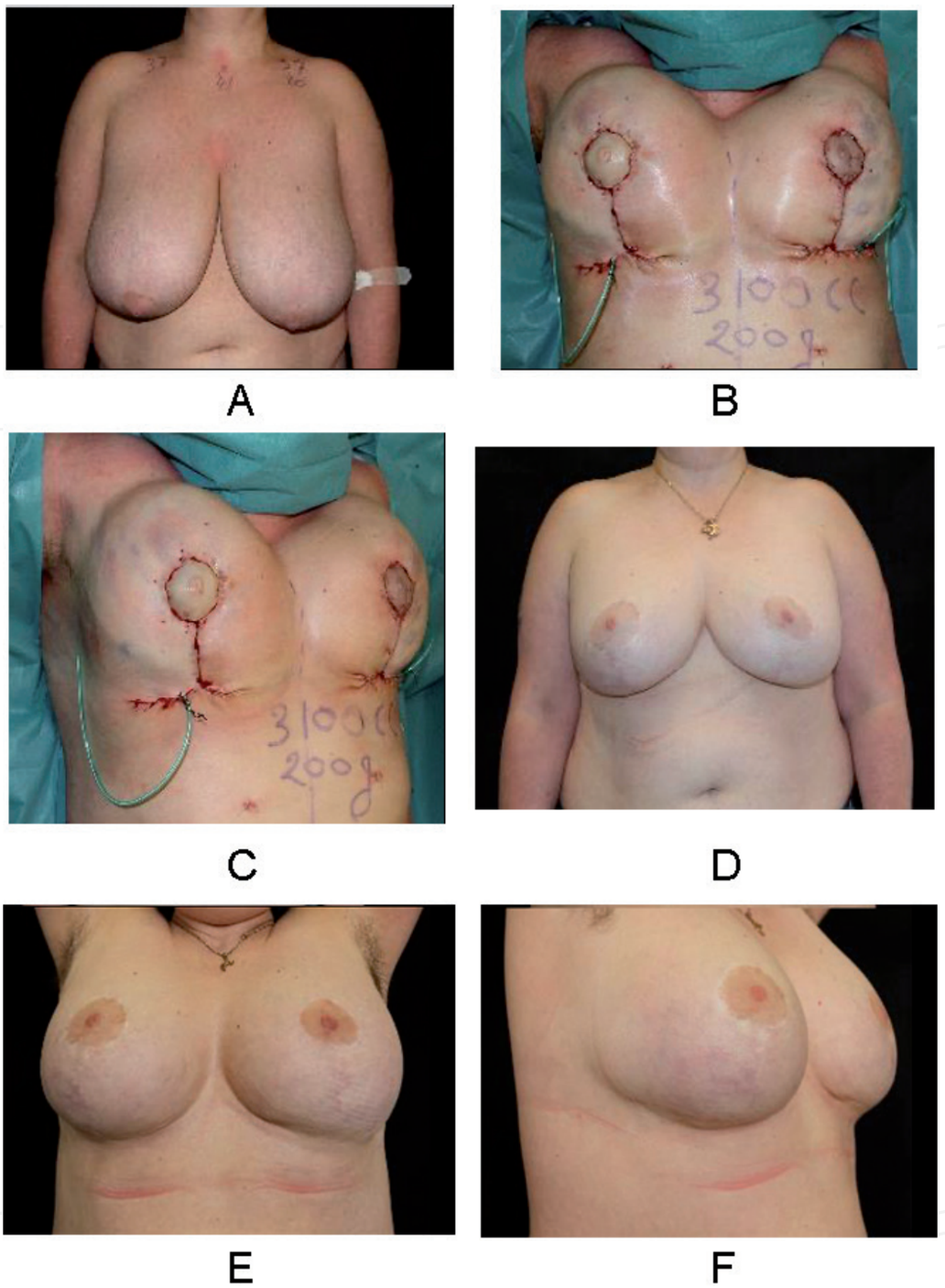

Figure 8.
(A) Preoperative photo of a 41-year-old female patient presenting with bilateral breast gigantomastia with asymmetry, breast ptosis and massive weight loss, with a distance from nipple-to-sternal notch of 37 cm on the right breast and 37 cm on the left. The patient underwent a P.a.L.M. procedure using a short T scar with NAC elevation of 17 cm on the right breast and 19 cm on the left, liposuction of 1450 mL on the right breast and 1650 mL on the left breast, glandular resection of 100 g of the right breast and 100 g from the left. (B, C) per-operative views. (D, E, F) results at 48 months postoperatively.

6. Postoperative care

A drain is left in place at the lower area of each breast for 48 hours or until the drainage becomes serosanguinous or serous and decreases in the daily average amount.

Gauze dressing is utilized to cover the breast wounds. One to two days post-operatively, the patient is discharged from the hospital with instructions to wear a compression bra for 6 weeks. Then, annually, patients receive postoperative breast imaging.

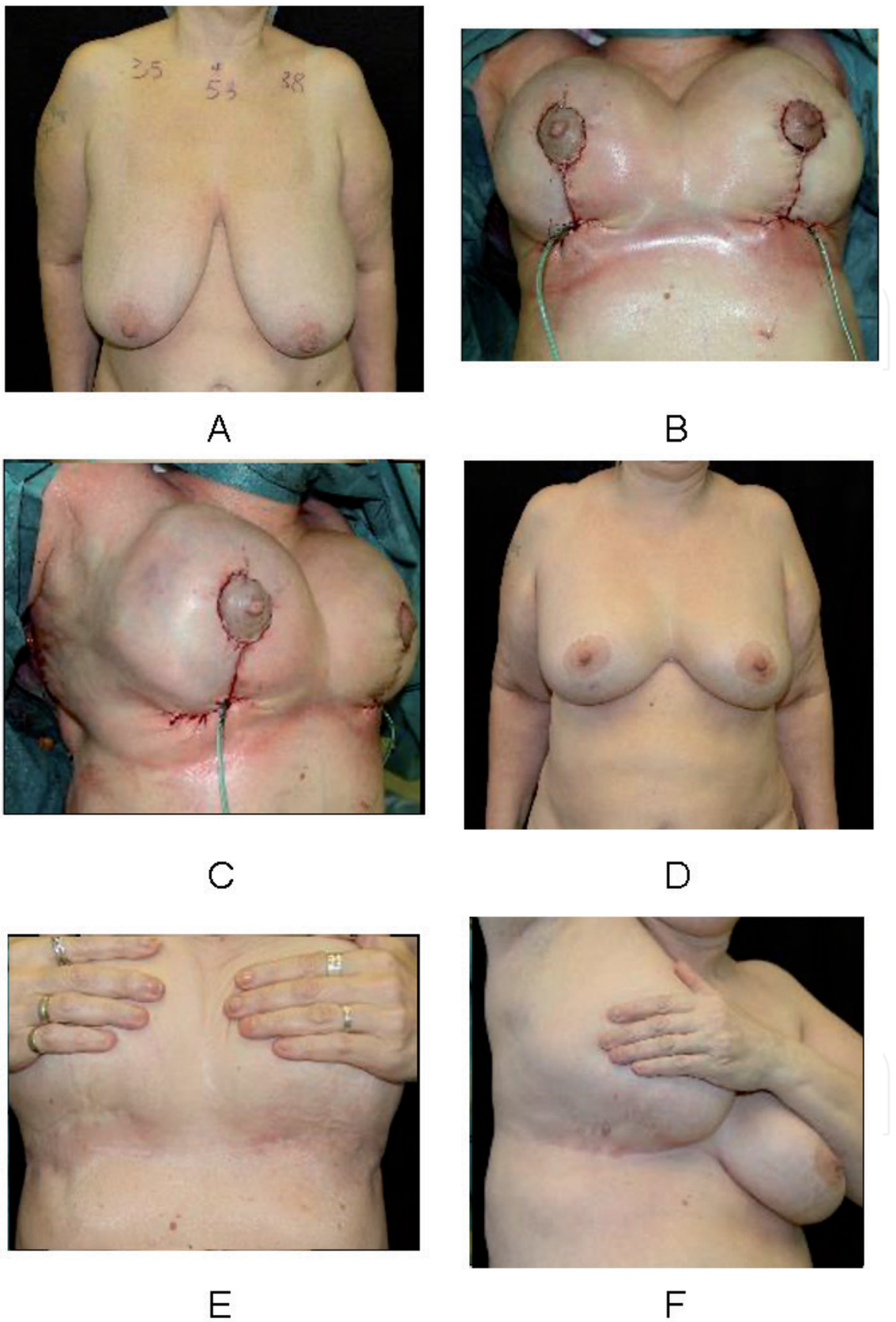

Figure 9.
(A) Preoperative photo of a 53-year-old female patient presenting with bilateral breast gigantomastia, severe ptosis and massive weight loss, with a distance from nipple-to-sternal notch of 35 cm on the right breast and 38 cm on the left. The patient underwent a P.a.L.M. procedure using a short T scar with NAC elevation of 14 cm on the right breast and 17 cm on the left, liposuction of 950 mL on the right breast and 1100 mL on the left breast, glandular resection of 150 g of the right breast and 150 g from the left. (B, C) per-operative views. (D, E, F) results at 36 months postoperatively.

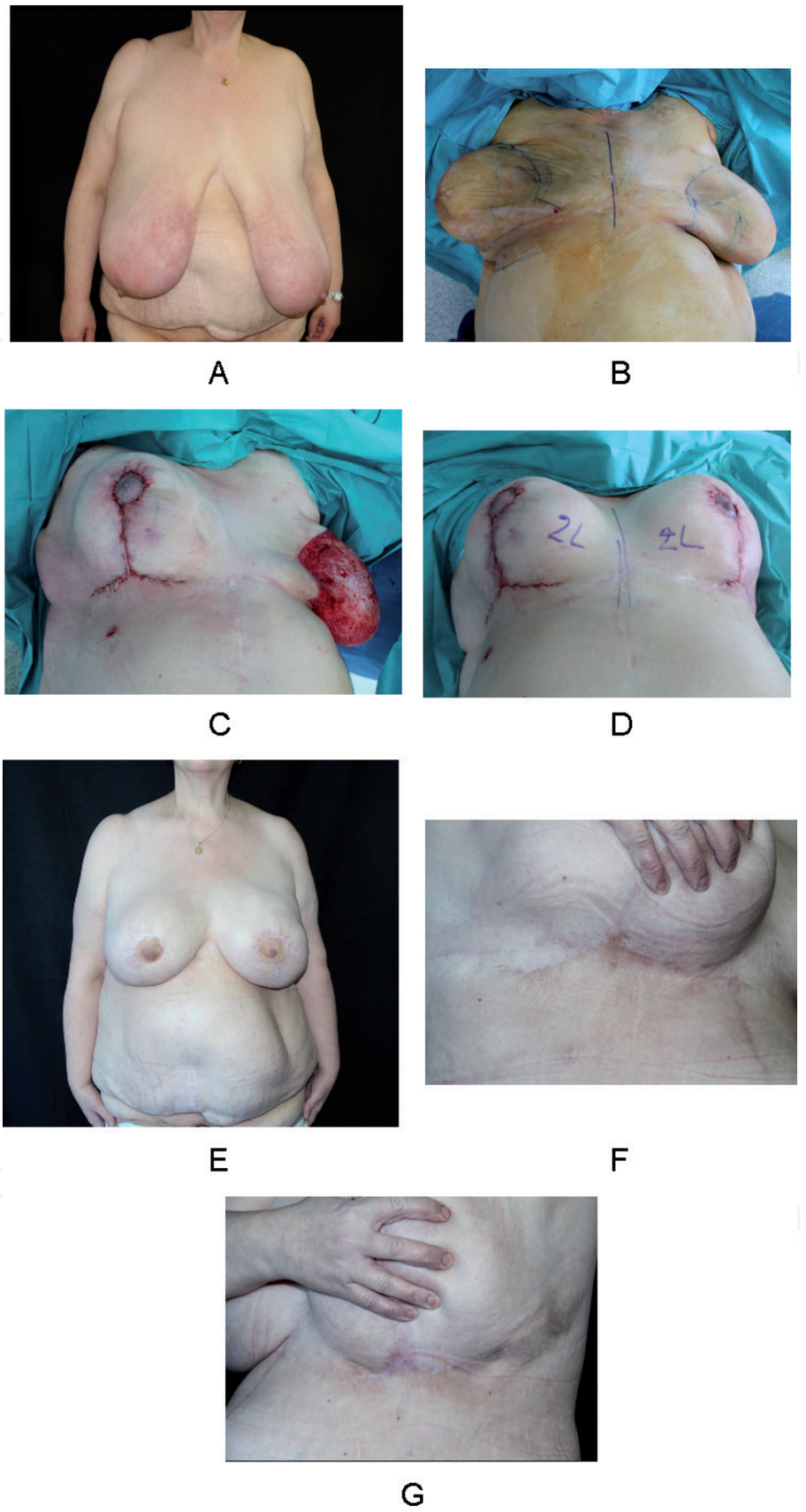

Figure 10.
(A) Preoperative photo of a 56-year-old female patient presenting with massive ptosis and massive weight loss. The patient underwent a P.a.L.M. procedure using a vertical scar with NAC elevation of 25 cm on the right breast and 29 cm on the left, liposuction of 2000 mL on the right breast and 2000 mL on the left breast, glandular resection of 200 g of the right breast and 400 g from the left. (B, C, D) per-operative views. (E, F, G) results at 24 months postoperatively.

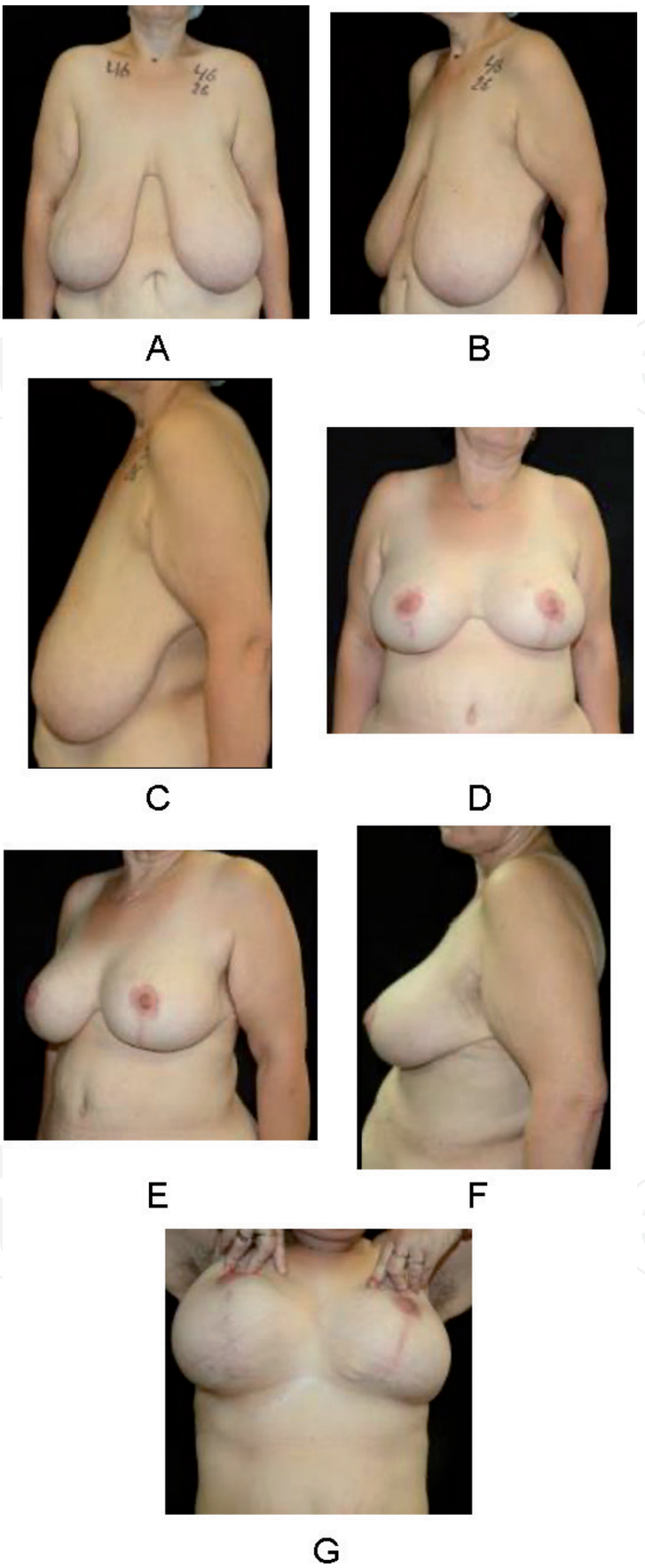

Figure 11.
(A, B, C) preoperative photos of a 50-year-old female patient presenting with gigantomastia, severe ptosis and massive weight loss, with a distance from nipple-to-sternal notch of 46 cm on the right breast and 46 cm on the left. The patient underwent a P.A.L.M. procedure using a short T scar with NAC elevation of 20 cm on the right breast and 20 cm on the left, liposuction of 2500 mL on the right breast and 2500 mL on the left breast, glandular resection of 120 g of the right breast and 150 g from the left. (D, E, F, G) results at 36 months postoperatively.

7. Outcome

A total of 426 consecutive women (852 breasts) underwent breast reduction with the PALM technique from January 2008 to January 2019. The NAC was based on the central, lateral, and superior pedicles. The parameters of interest included BMI, age, previous breast surgery, smoking, N-SN distance, weight of the resected specimen, preoperative breast size, extent of NAC elevation, total volume of fat aspirated per breast, and the type of final wound closure.

The patient comorbidities noted included diabetes mellitus, obesity, hypertension, coronary artery disease, smoking, and breast cancer. Patients presenting after implant removal, in addition to those presenting for unilateral or breast reduction after any type of breast oncologic surgery were excluded from the study. Complications such as hematoma, partial areolar necrosis, seroma, wound dehiscence and/or wound infection were also recorded. Data was integrated and analyzed in a computerized database. All patients are followed up for 2 years following surgery.

The mean age of the patients was 39 years (range, 20–69 years), the mean BMI was 31 kg/ m^2 (range, 24–43 kg/m^2), the mean NAC elevation was 17 cm (range, 10–30 cm), and the mean N-SN distance was 37 cm (range, 29–49 cm). Thirty-seven of the 426 patients (9%) were smokers. The mean glandular resection mass was 245 g (range, 40–630 g), and the mean lipoaspirate volume was 750 mL per breast (range, 270–3200 mL). Twenty-nine patients (7%) presented with gigantomastia. The mean glandular resection mass per breast was 3.1 kg (range, 2.9–3.5 kg), and the mean body weight of these 11 patients was 91 kg (range, 82–99 kg) (**Tables 1** and **2**).

A short T wound-closure pattern was applied for 596 of the 856 breasts (71%), whereas the vertical and J wound-closure patterns were applied for 204 breasts

Number of patients	426
Number of breasts	852
Age (years)	39 (range 20–69)
BMI (kg/m^2)	31 (range 24–43)
Number of smokers	37

Table 1.
Patients demographics.

NAC elevation (cm)	17 (range 10–30)
N-SN distance (cm)	37 (29–49)
Liposuction per breast (mL)	750 (range 270–3200)
Glandular resection	245 (range 40–630)
Number of breasts treated with vertical scar	204
Number of breasts treated with short T scar	596
Number of breasts treated with J scar	42
Follow-up (months)	26 (range 12–48)

NAC: Nipple-Areola Complex; N-SN: Nipple to Sternal Notch.

Table 2.
Operative data.

Complication	Number of breasts (%)
Wound infection	8 (0.9%)
Seroma	26 (3%)
Hematoma	6 (0.7%)
Wound dehiscence	8 (0.9%)
Partial areolar necrosis	4 (0.5%)
Total areolar necrosis	0
Revision surgery	**Number of patients (%)**
	21 (5%)

Table 3.
Complications following PALM.

(24%) and 42 breasts (5%), respectively. The patients were monitored for an average of 26 months (range, 12–48 months) (**Table 2**). At ≥12 months postoperatively, all patients presented with maintenance of the upper-pole fullness (**Figures 6–9**).

Postoperative complications included seroma detection in 26 breasts (3%), the development of wound infections in 17 breasts (2%), and wound dehiscence in eight breasts (0.9%). No patients developed hematoma nor total areolar necrosis, but four patients, both of whom were current smokers had partial areolar necrosis (1%). The revision surgery rate was 5%. Each case with postoperative complications was successfully treated conservatively (**Table 3**).

8. Discussion

The goals of reduction mammaplasty and mastopexy include safety and predictability, fast recovery, long-lasting results, and minimal complications, as well as the achievement of an appropriate size, shape, and projection of the breast [49]. Successful results are ascribed to the surgeon's experience and understanding of breast anatomy, patient age and expectations, skin quality, and the degree of ptosis [17]. The PALM surgical technique provides a customizable approach to reduction mammaplasty and mastopexy that also accommodates patients with gigantomastia and massive breast ptosis, averting the challenges of conventional vertical mammaplasty such as reduced NAC sensitivity postoperatively, kinking of the pedicle, and venous congestion of the NAC.

Breast liposuction as a sole procedure or in conjunction with parenchymal resection has proven to be a safe and reliable [19–28] approach to decrease breast weight and volume. Our personal experience shows that liposuction is appropriate for breasts with lateral fullness and inferior excess. Liposuction facilitates longevity of a desired breast shape and delays ptosis when excess tissue is taken out, pulling forces are reduced, a natural contour is reestablished, and superior rotation of the breast is promoted. If there is asymmetry after bilateral breast reduction, liposuction is a sufficient and dependable option to restore breast symmetry and improve the breast shape. The PALM technique includes liposuction for breast shaping and volume reduction, restricting parenchymal resection to the inferior pole of the breast and ensuring tension-free folding of the NAC during its superior transposition. This procedure is even indicated for cases of severe ptosis in which massive folding and substantial NAC elevations are expected and when the superior pedicle does not supply adequate blood supply to the NAC. A better definition of the breast contour and enhancement of skin retraction can be obtained through liposuction

and tunnelization below the inframammary fold using a Lipomatic system. This will further redrape the vertical wound closure to reduce puckering, wrinkling, and the need for scar revision.

By reducing the degree of tissue dissection and resection, the PALM technique aims to preserve an optimal blood supply to the breast. In this technique, liposuction is considered as a key step for volume and weight reduction. Dissection is restricted to a section of the inferior pole and the medial aspect of the breast, and minimal tissue resection is limited to a part of the lower outer quadrant.

To ensure a maximal vascularization to the breast parenchyma and NAC, it is essential to preserve the central, lateral, and superior pedicles. NAC sensitivity is also maintained in the PALM technique through a lateral pedicle containing Wuringer's horizontal septum [50], which carries a neurovascular supply to the NAC and can be combined into septum-based mammaplasty via the methods developed by Hamdi et al. [17]. Greater NAC elevations can be attained with a continuous blood supply to the NAC. Protection of the periareolar vein polygon is achieved through deepithelialization of a wide surface area of skin around the NAC [51], which also maintains the venous networks supplying the NAC. Breast tissue resection is reduced to a minimum with PALM to promote sufficient venous drainage of the NAC through large transposition distances that are necessary for patients with gigantomastia and noticeable breast ptosis. NAC elevations as big as 28 cm were accomplished with PALM.

The preservation of blood supply to the breast reduces the rate of wound healing complications with PALM. A 3-mm dermal rim is preserved around the edge of the breast wound; therefore, PALM facilitates wound closure and ensures apposition and eversion of the wound edges under minimal tension, enhancing wound healing and decreasing excessive scaring. Adequate preservation of a large area of deepithelialized tissue around the gland carrying the NAC also develops a firm anchoring structure at the deepithelialized edges for sutures from the dermis to the chest wall during glandular transposition. In addition, PALM enables the development of a superior pocket, supplying a comfortable fit of the transposed parenchymal tissue that reduces tension on the NAC upon final wound closure. PALM can be completed with just two V-Loc sutures. The V-Loc sutures are encouraged for glandular suspension and skin closure because they reduce operating times, wound complications, and foreign-body interaction because they require less suture material and fewer knots.

Additionally, V-Loc sutures decrease compression of the glandular and fatty tissue during suspension of the gland in its new position because fewer knots are needed. In our opinion, when approximating the two pillars in superior pedicle breast reduction, the application of V-Loc sutures can minimize fat necrosis from compression of the parenchyma and gland. There are various benefits associated with glandular suspension sutures from the dermis to the chest wall sutures. To affix the breast parenchyma in its new position, V-Loc sutures are placed from the second rib at the upper pole to the sixth rib inferiorly. Upper-pole fulness and parenchymal support is ensured through the use of strong V-Loc sutures, attaching the dermal edges of the breast glandular flap to the rib perichondrium in the presence of a superior pocket accommodating the flap. The new IMF is redefined utilizing 2 cm to 4 cm cephalad to its original location according to the extent of ptosis. This step is achieved utilizing V-Loc sutures.

After glandular suspension in the desired position, a single 3–0 V-Loc suture is applied for vertical and periareolar wound closure under minimal tension. Various patterns of skin closure are compatible with PALM. When the NAC elevation is less than 10 cm, a vertical wound closure is chosen preoperatively. However, when the NAC elevation is greater than 10 cm, the decision for a short T or J wound closure is decided intraoperatively after the NAC is elevated to the desired position and redraping of the parenchymal tissues.

In this study, most patients presented with ptotic breasts that required NAC elevations greater than 10 cm. Therefore, a short T wound-closure pattern was most common. Postoperatively, 24 patients (12%) became pregnant, specifically nine primary and 15 secondary or tertiary pregnancies. After PALM, all 24 patients were able to breastfeed, with the preservation of breastfeeding capacity attributed to reduced glandular resection and maintenance of the maximal amount of breast parenchyma.

Although liposuction is a frequently performed procedure in plastic surgery, few surgeons have much experience with breast liposuction and especially power-assisted breast liposuction. As a result, a limitation of PALM is the learning curve for surgeons to learn the skills necessary to undertake power-assisted breast liposuction. Due to the diligence, attention to detail, and precision required for surgeons to perform breast liposuction, the senior author recommends that liposuction be performed in small volumes and that cases of massive ptosis and gigantomastia be avoided entirely until the adequate skills are developed.

Fatty breasts are easily treatable using the PALM technique, whereas glandular breasts are considered as more difficult cases since liposuction is limited. Nevertheless, those glandular tissues are not contraindicated for the PALM technique. Various measures can assist is achieving satisfactory results and overcome the challenges associated with glandular breasts, such as precisely and delicately performing liposuction of the breast, expanding the amount of glandular resection from the lower pole while preserving the lateral septum, and dissecting a larger upper-pole pocket to accommodate the transposed glands.

Tips for making precise preoperative markings for PALM are fundamental for obtaining an esthetically pleasing and symmetrical breast shape. The main tips include:

- Performing liposuction of the lower lateral and areolar zones to minimize tension and kinking of the NAC and gland during transposition.
- Maximizing the NAC arterial supply and venous return by depending on breast liposuction and minimizing glandular resection.
- Liposuction of the lower lateral quadrant of the breast at the end of the procedure for improved breast shape and contour.
- Tunnelization of the area below the inframammary fold to enable better skin retraction and redraping; this also helps avoid puckering.
- Liposuction the breast at the end of procedure to fix asymmetry and provide additional volume and size reduction.

9. Conclusion

The Power-Assisted Liposuction Mammaplasty associates breast liposuction and mammaplasty into a surgical approach that provides an optimal vascularization to the breast by preserving the central, superior and pedicles as well as reducing skin undermining and glandular resection. PALM is a reliable and safe alternative for mastopexy and reduction mammaplasty. This technique is indicated for patients with extensive ptosis and gigantomastia because of the preservation of the blood supply to the breast. The long-term results of PALM include an esthetically pleasing breast shape with superior pole fullness and without any boxiness or bottoming out.

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